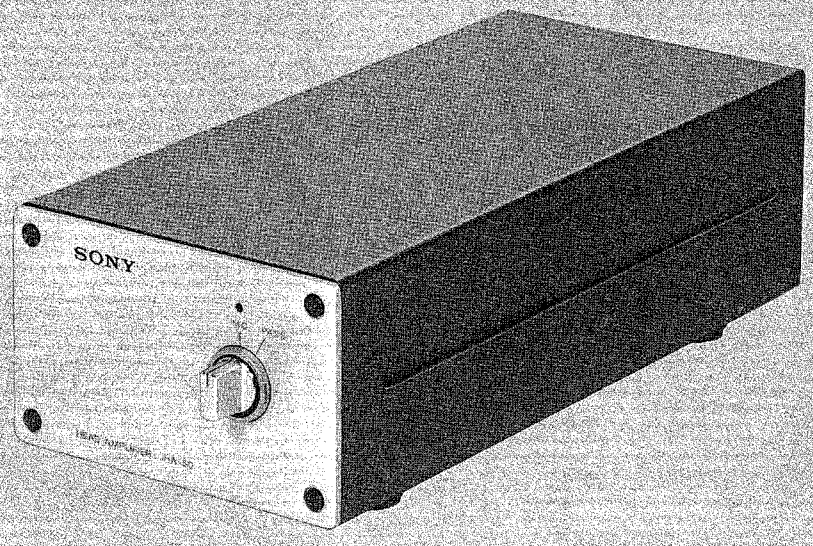
HA-50

3410
E Model



HEAD AMPLIFIER

SPECIFICATIONS

Power Requirements:	220 – 240 V, 50/60 Hz
Power Consumption:	6 W
Frequency Response:	6 Hz – 1 MHz $^{+0}_{-1}$ dB
Voltage Gain:	26dB
Equivalent Input Noise Level:	–152 dBV (RIAA +A curve, closed-circuit)
Harmonic Distortion:	0.003 % (1 kHz)
Maximum Input Capability:	100 mV
Input Impedance:	100 Ω
Dimensions:	Approx. 120 (w) x 80 (h) x 280 (d) mm $4\frac{3}{4}$ (w) x $3\frac{1}{8}$ (h) x 11 (d) inches including projecting parts and controls
Weight:	Approx. 1.8 kg, 4 lb

SAFETY-RELATED COMPONENT WARNING!!

COMPONENTS IDENTIFIED BY SHADING AND MARK ⚠ ON THE SCHEMATIC DIAGRAMS, EXPLODED VIEWS AND IN THE PARTS LIST ARE CRITICAL TO SAFE OPERATION. REPLACE THESE COMPONENTS WITH SONY PARTS WHOSE PART NUMBERS APPEAR AS SHOWN IN THIS MANUAL OR IN SUPPLEMENTS PUBLISHED BY SONY.

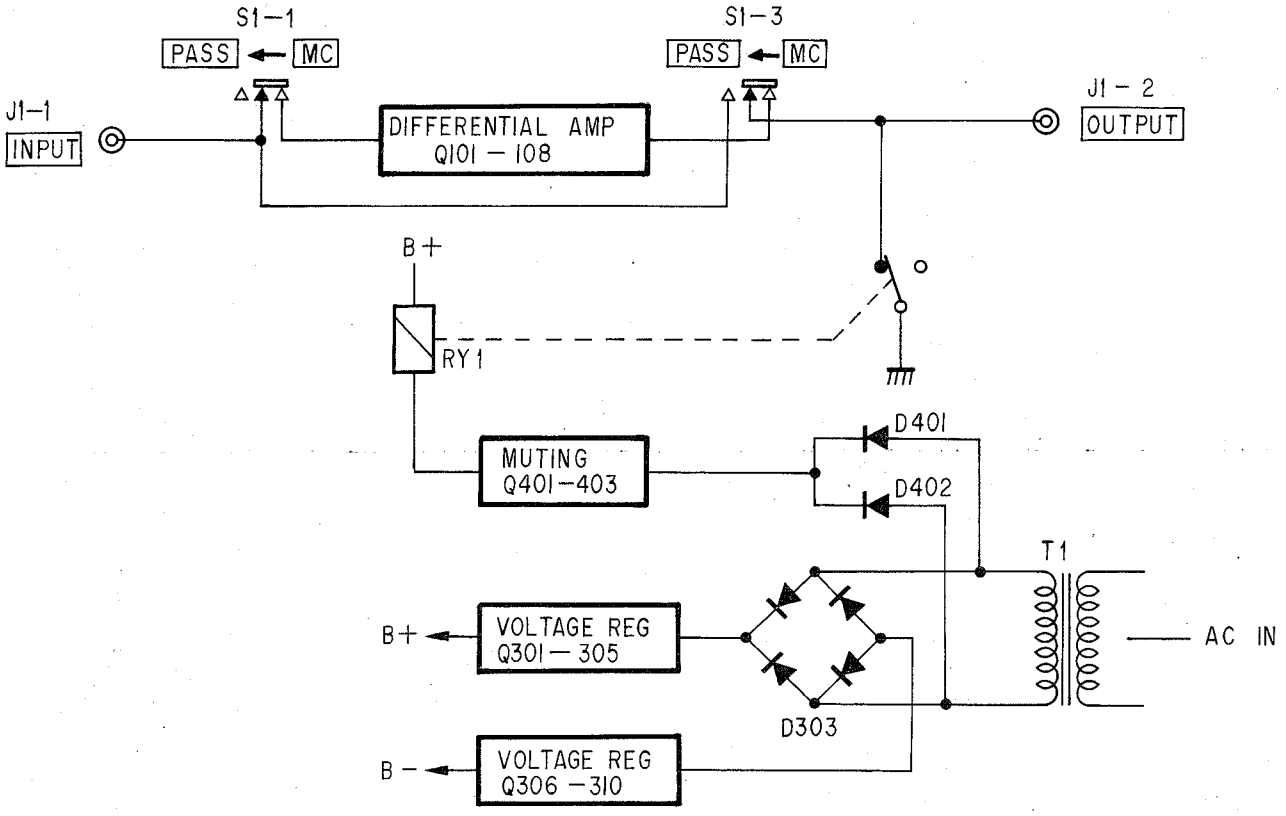
SONY®

SERVICE MANUAL

3410

SECTION 1
OUTLINE

1-1. BLOCK DIAGRAM



1-2. CIRCUIT DESCRIPTION

Muting Circuit

The HA-50 employs the muting circuit to eliminate noise produced when the HA-50 is turned on or off.

1. When the HA-50 is turned on (See Fig. 1):

The B+ voltage (9.4 V) rectified by D401 and D402 is applied to C401 through R401. C401 is charged at the short-time constant of C401 and R401 (route ①). Q401 conducts when the its base voltage exceeds 0.6 V (route ②). Accordingly, the collector of Q401 is momentarily grounded. This turns Q402 off. On the other hand, B+ voltage (13 V) rectified by the full-wave diode bridge D303 is charged in C402 through R406. The charging time of C402 is determined by the time constant of R406 and C402 (route ③).

When C402 is fully charged (3-4 seconds later after the HA-50 is turned on), Q403 conducts. The on state of Q403 energizes the relay RY1. The head amplifier outputs are removed from the ground connection by RY1.

As a result, the audio signal is not muted.

2. When the HA-50 is turned off (See Fig. 1):

The potential charged in C401 momentarily discharges through R402 and R403 (route ⑤). This turns Q401 off. The collector potential of Q401 rises, therefore, biasing the base of Q402 through R405, D403 and D404 (route ⑥).

The potential charged in C402 discharges through Q402 (route ⑦).

No bias is presented to the base of Q403, turning it off. As a reuslt, RY1 is not energized and the head amplifier output terminals are grounded.

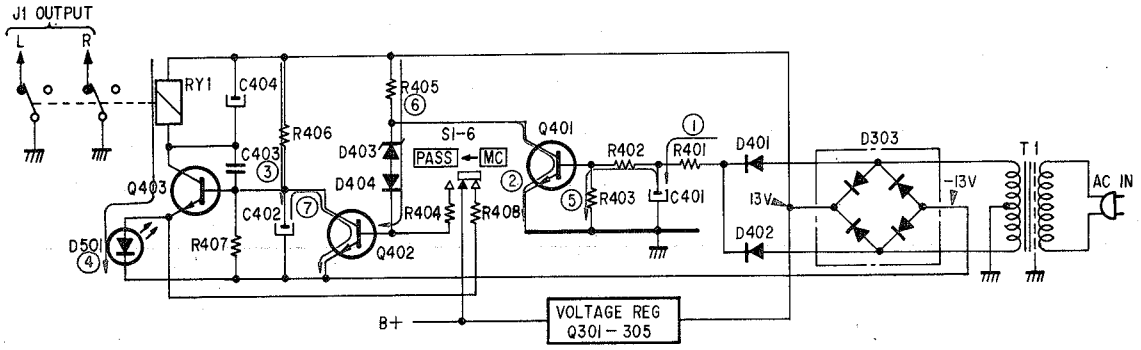


Fig. 1

Switch Connection Table ( ): R-CH

Position	S1–1 (S1–2)	S1–3 (S1–4)	S1–6
MC	△▲△	△▲△	△▲△
MC → PASS	△▲△	△▲△	△▲△
PASS → MC	△▲△	△▲△	△▲△
PASS	△▲△	△▲△	△▲△

3. When S1 is being changed from MC to PASS position (See Fig. 2):

B+ voltage (6.9 V) is applied to the base of Q402 through S1–6 and R404 (route ①), and Q402 is turned on.

The potential charged in C402 discharges through Q402 (route ②). This removes the base bias of Q403, therefore, turning Q403 off.

The relay (RY1) is not energized and the head amplifier outputs are grounded. Accordingly, the output signals are muted.

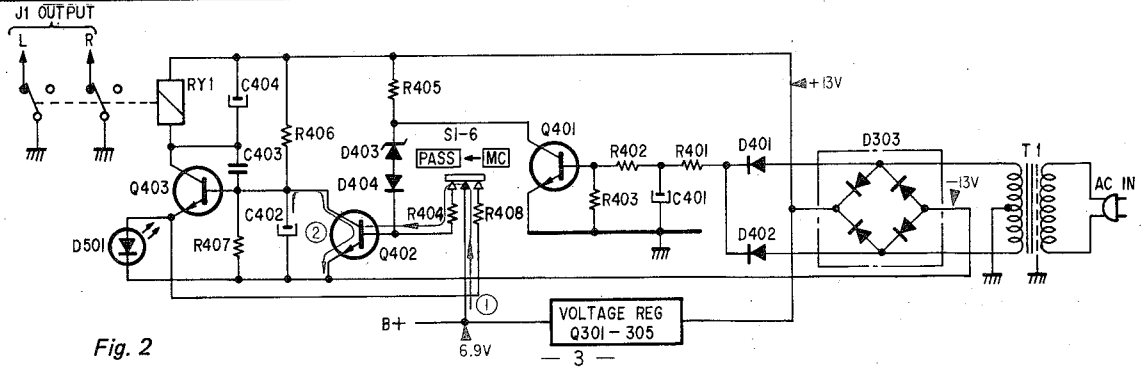


Fig. 2

4. **After S1 has been changed to PASS position (See Fig. 3):**

B+ voltage (6.9 V) is applied to the base of Q402 through S1 – 6 and R404 (route ①). This turns Q402 on (route ②) and Q403 off. The relay (RY1) is not energized and the head amplifier outputs are grounded. Therefore, the output signals are muted.

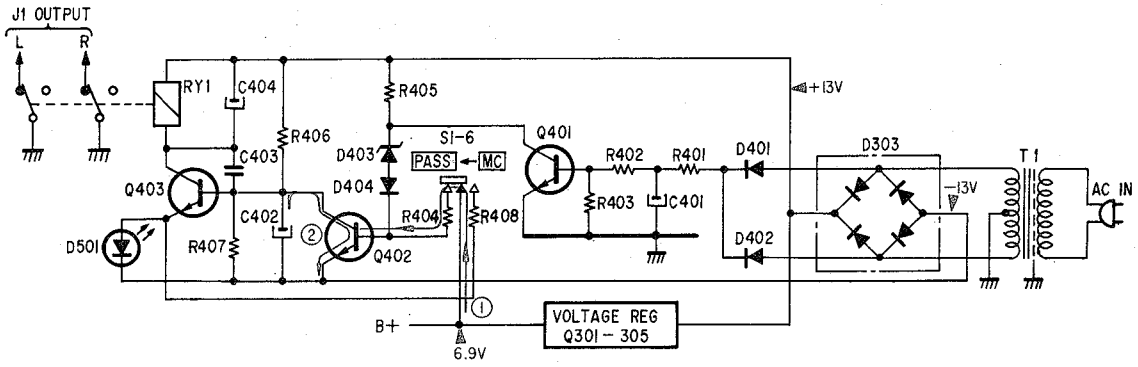


Fig. 3

5. **LED (D501) Operation (See Fig. 4):**

- When S1 is being changed from PASS to MC position, B+ voltage (6.9 V) is applied to D501 through S1–6 and R408, and D501 dimly lights (route ①).

  Three or four minutes later after S1 has been changed to MC position, the muting circuit operates and Q403 is turned on.

  B+ voltage (13 V) is applied to D501 through RY1 and Q403. Therefore, D501 brightly lights (route ②).

- When the HA-50 is turned on with S1 set to MC position, the regulator circuit starts to operate before the muting circuit operates. B+ voltage (6.9 V) is applied to D501 through S1–6 and R408, and D501 dimly lights.

  After three or four minutes, the muting circuit operates. This turns Q403 on.

  B+ voltage (13 V) is applied to D501 through RY1 and Q403. Therefore, D501 brightly lights.

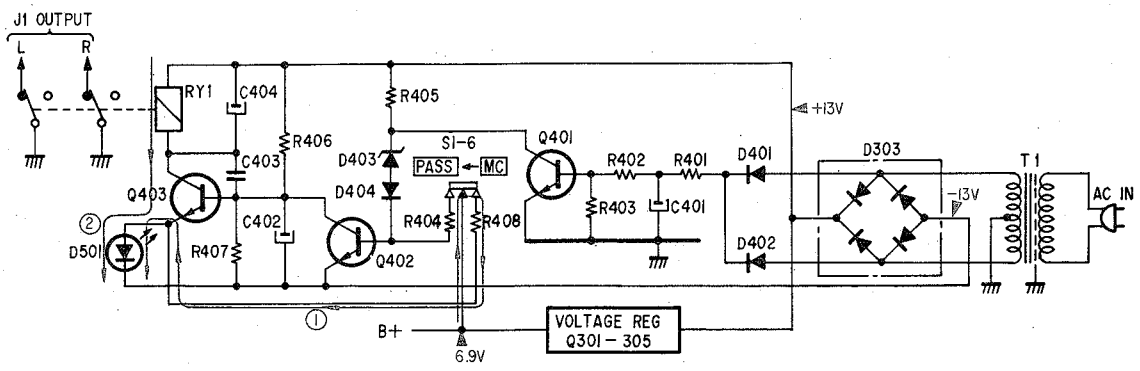
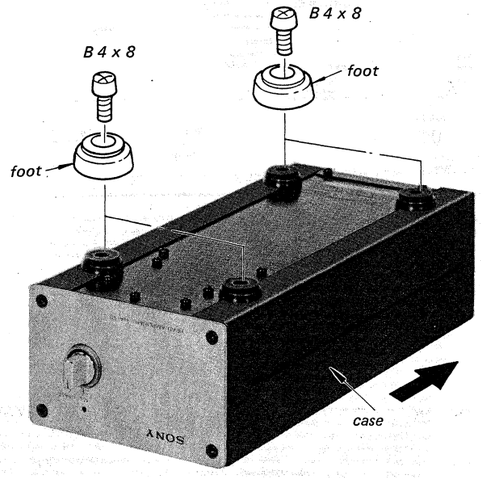


Fig. 4

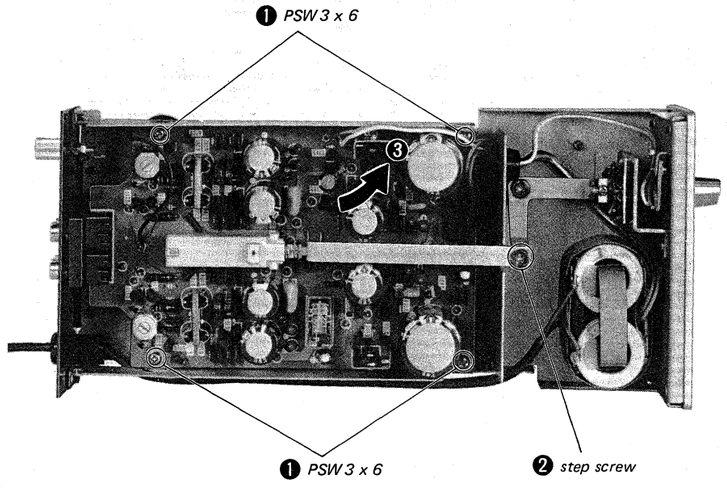
SECTION 2
DISASSEMBLY

- Follow the disassembly procedure in the numerical order given.

Case Removal



Circuit Board Removal



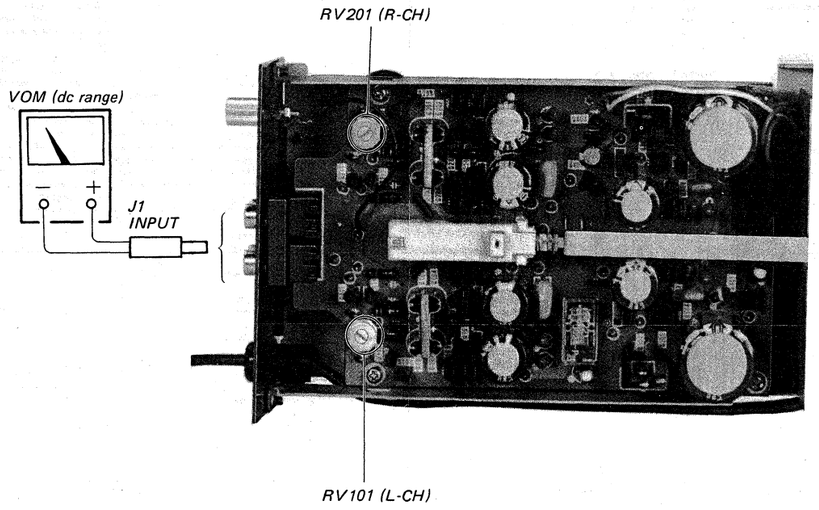
SECTION 3
ADJUSTMENT

OFFSET VOLTAGE ADJUSTMENT

Note: Make the adjustment after the power in and ten minute passed.

Adjust RV101 (L-CH) and RV201 (R-CH) for 0V dc reading on the VOM.

Adjustment Location:



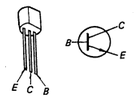
SECTION 4
DIAGRAMS

4-1. MOUNTING DIAGRAM
— Conductor Side —

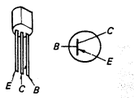
- **Replacement Semiconductors**

For replacement, use semiconductors except in ( ).

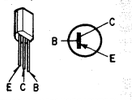
Q101, 201, Q102, 202, Q110, 210, Q111, 211: 2SC2014



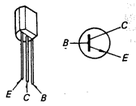
Q103, 203, Q104, 204: 2SA1066



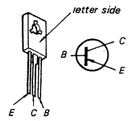
Q105, 205, Q304, Q307, 308: 2SA872-E (2SA872)



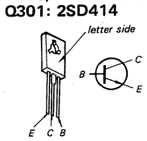
Q106, 206, Q302, 303, Q309, Q401, 403: 2SC1775, 2SC1364



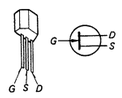
Q107, 207: 2SA899
Q306: 2SB548



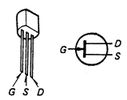
Q108, 208: 2SC1904
Q301: 2SD414



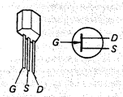
Q109, 209, Q112, 212: 2SK42-1



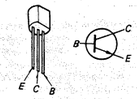
(2SK120)



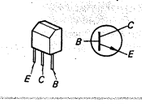
Q305, Q310: 2SK42-2 (2SK42)



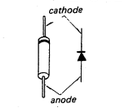
Q402: 2SC1475



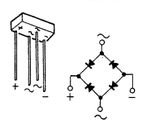
(2SC1213A)



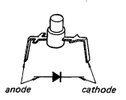
D301, 302: HZ6B-2L (HZ6B-1L)
D401, 402, D404, 405: 1S1555
D403: HZ16-3L (HZ16-1L)

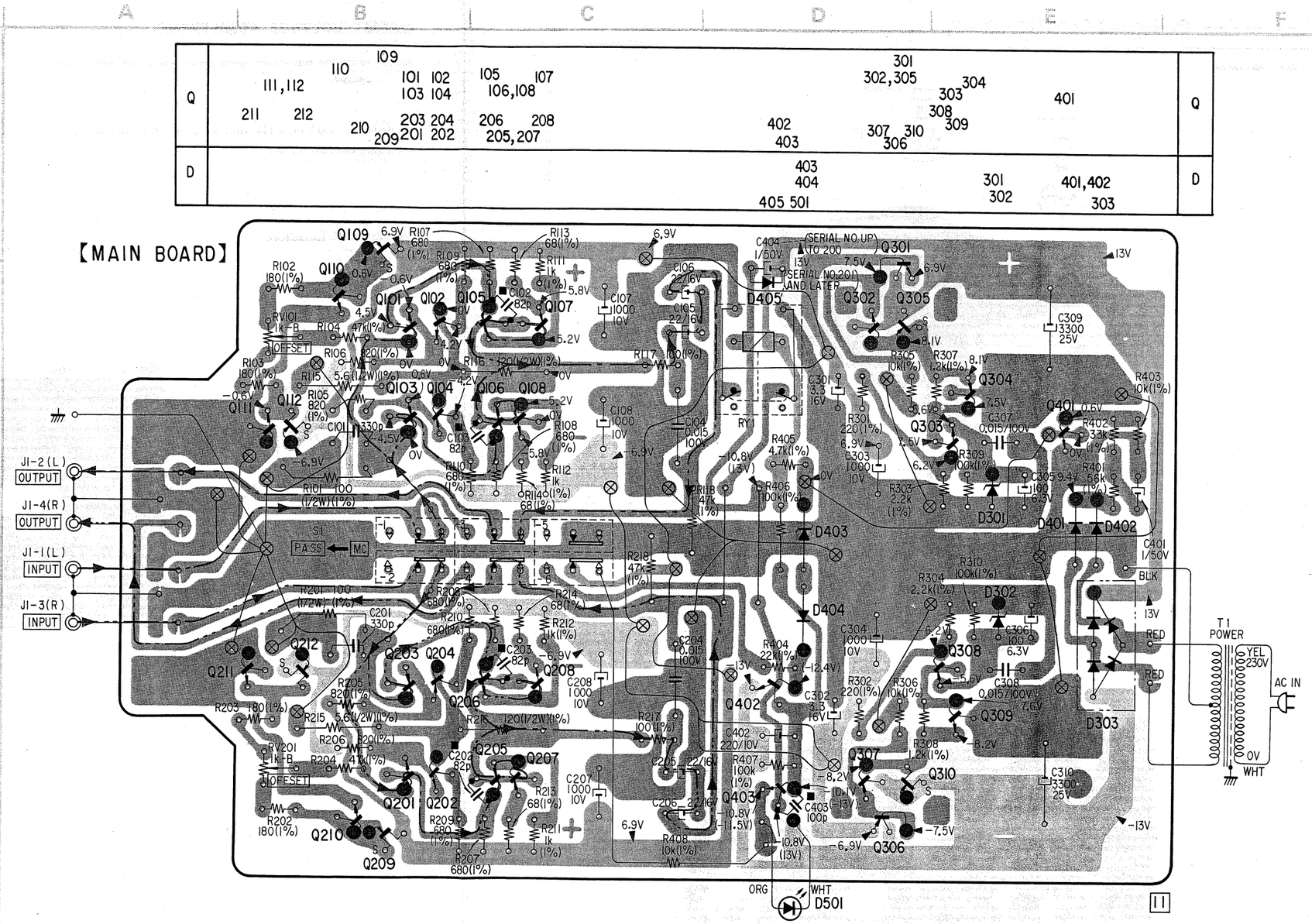


D303: SIRB10



D501: SEL103R



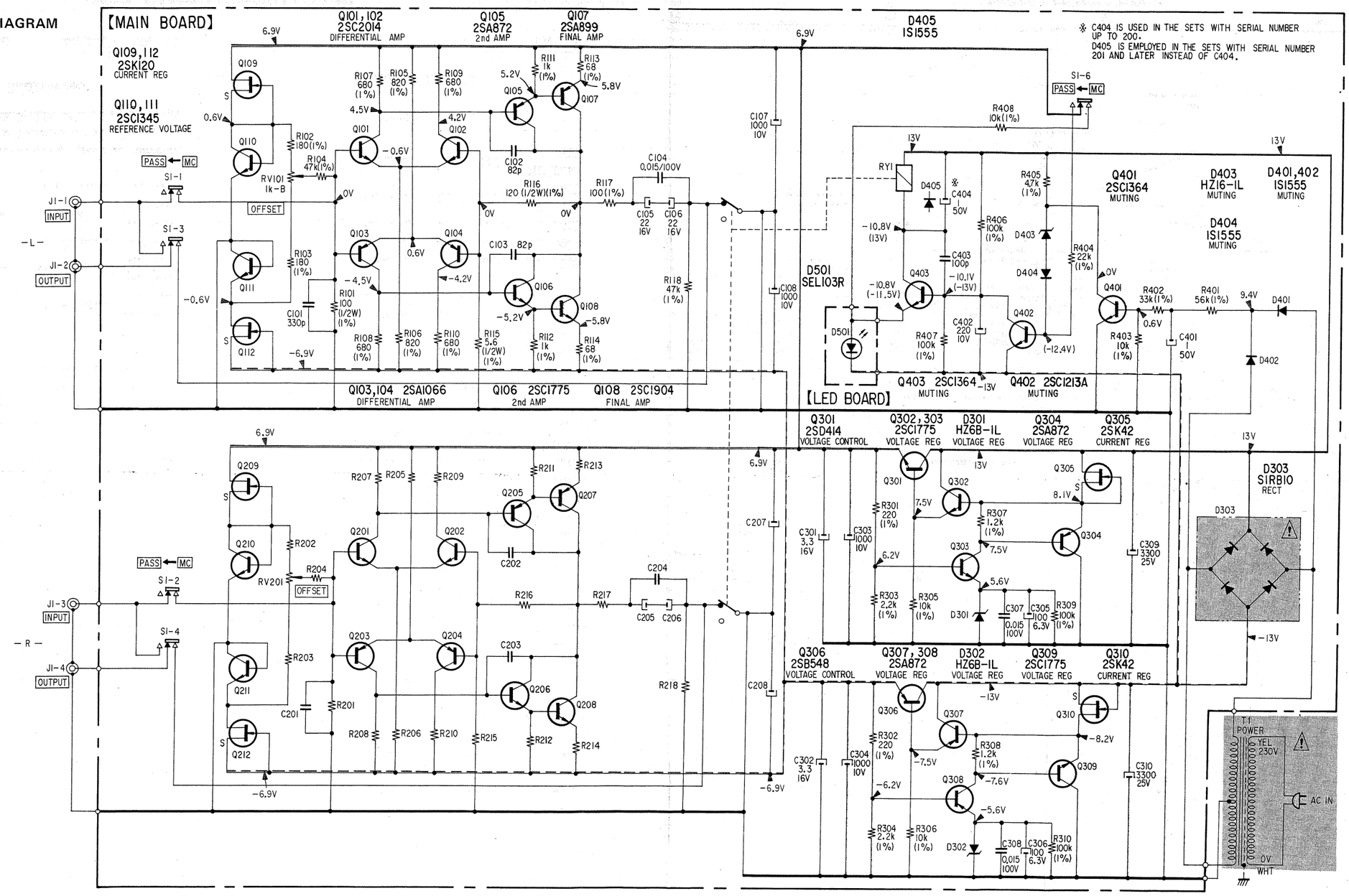


Note:

- ○— : parts extracted from the component side.
- ■ : part mounted on the conductor side.
- ⊗ through hole
  component-side pattern
- : B+ pattern.
- : B− pattern.

- Readings are taken under no-signal conditions with a VOM (20 kΩ/V).
  Power Voltage : 240 V
  no mark : MC mode
  ( ) : PASS mode
- Signal Path
  — — → : L-CH
  —·— → : R-CH

4-2. SCHEMATIC DIAGRAM



Note:

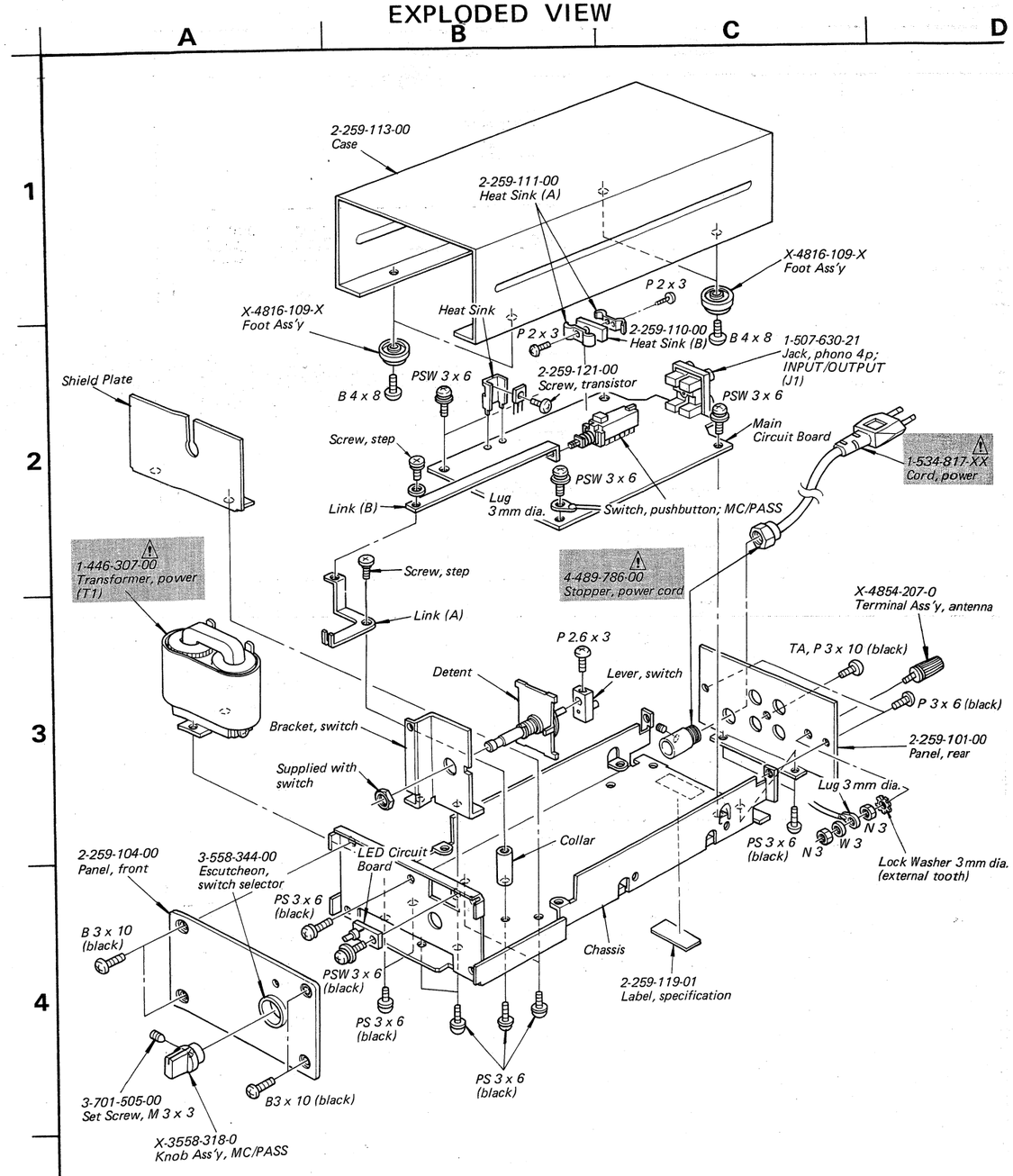
- All capacitors are in μF unless otherwise noted. pF = μμF 50 WV or less are not indicated except for electrolytics.
- All resistors are in ohms, ¼ W unless otherwise noted. kΩ = 1000 Ω; MΩ = 1000 kΩ
- 1% indicates component tolerance.
- ▭: panel designation.
- ▭: adjustment for repair.
- Readings are taken under no-signal conditions with a VOM (20 kΩ/V).
  Power Voltage : 240 V
  no mark : MC mode
  ( ) : PASS mode
- ——— : B+ bus.
- – – – : B– bus.
- Switch

Ref. No.	Switch	Position
S1-1–4,6	MC/PASS	MC

Note: The components identified by shading and mark ⚠ are critical for safety. Replace only with part number specified.

SECTION 5

EXPLODED VIEW



Note: The components identified by shading and mark ⚠ are critical for safety. Replace only with part number specified.

Note:

- Items with no part number and/or no description are not stocked because they are seldom required for routine service.
- All screws are Phillips (cross recess) type unless otherwise noted.
  (–) = slotted head

SECTION 6

ELECTRICAL PARTS LIST

Ref. No.	*Part No.*	*Description*	
		SEMICONDUCTORS	
		Transistors	
Q101, 201 Q102, 202	8-765-493-00	2SC2014	
Q103, 203 Q104, 204	8-765-523-00	2SA1066	
⇒Q105, 205	8-729-387-28	2SA872-E	
Q106, 206	8-729-377-58	2SC1775	
Q107, 207	8-729-989-93	2SA899	
Q108, 208	8-729-999-43	2SC1904	
⇒Q109, 209	8-727-311-03	2SK42-1	
Q110, 210 Q111, 211	8-729-334-58	2SC1345	
⇒Q112, 212	8-729-311-03	2SK42-1	
Q301	8-729-141-43	2SD414	
Q302 Q303	8-729-377-58	2SC1775	
⇒Q304	8-729-387-28	2SA872-E	
⇒Q305	8-727-312-00	2SK42-2	
Q306	8-729-154-83	2SB548	
⇒Q307 Q308	8-729-387-28	2SA872-E	
Q309	8-729-377-58	2SC1775	
⇒Q310	8-727-312-00	2SK42-2	
Q401	8-729-663-47	2SC1364	
⇒Q402	8-760-413-10	2SC1475	
Q403	8-729-663-47	2SC1364	
		Diodes	
⇒D301, 302	8-719-910-65	HZ6B-2L	
D303	⚠8-719-510-10	SIRB10	
D401, 402	8-719-815-55	1S1555	
⇒D403	8-719-901-63	HZ16-3L	
D404, 405	8-719-815-55	1S1555	
D501	8-719-301-03	SEL103R	

⇒: Due to standardization, interchangeable replacements may be substituted for parts specified in the diagrams.

Note: The components identified by shading and mark ⚠ are critical for safety. Replace only with part number specified.

Ref. No.	*Part No.*	*Description*		
		CAPACITORS		
All capacitors are in μF and electrolytic unless otherwise noted. 50 WV or less are not indicated except for electroeytics and tantalum. pF : μμF, elect = electrolytic				
C101, 201	1-102-820-00	330 p		ceramic
C102, 202 C103, 203	1-102-971-00	82 p		ceramic
C104, 204	1-129-927-00	0.015	100 V	polypropylene
C105, 205 C106, 206	1-131-201-00	22	16 V	tantalum
C107, 207 C108, 208	1-123-462-00	1000	10 V	
C301, 302	1-131-449-00	3.3	16 V	tantalum
C303, 304	1-123-462-00	1000	10 V	
C305, 306	1-131-295-00	100	6.3 V	tantalum
C307, 308	1-129-927-00	0.015	100 V	polypropylene
C309, 310		3300	25 V	
C401	1-121-391-00	1	50 V	
C402	1-121-420-11	220	10 V	
C403	1-102-106-00	100 p		ceramic
C404	1-121-391-00	1	50 V	
		RESISTORS		
All resistors are in ohms. (kΩ: 1000 Ω, MΩ: 1000 kΩ)				
R101, 201	1-214-638-00	100	½ W	1% metal film
R102, 202 R103, 203	1-214-114-00	180	¼ W	1% metal film
R105, 205 R106, 206	1-214-130-00	820	¼ W	1% metal film
R107–110 R207–210	1-214-128-00	680	¼ W	1 % metal film
R111, 211 R112, 212	1-214-616-00	1 k	¼ W	1% metal film
R113, 213 R114, 214	1-214-104-00	68	¼ W	1% metal film
R115, 215		5.6	½ W	1% metal film
R116, 216		120	½ W	1% metal film
R117, 217	1-214-615-00	100	¼ W	1% metal film
R118, 218	1-214-617-00	47 k	¼ W	1% metal film

Ref. No.	*Part No.*	*Description*		
R301, 302	1-214-116-00	220	¼ W	1% metal film
R303, 304	1-214-140-00	2.2 k	¼ W	1% metal film
R305, 306	1-214-156-00	10 k	¼ W	1% metal film
R307, 308	1-214-134-00	1.2 k	¼ W	1% metal film
R309, 310	1-214-618-00	100 k	¼ W	1% metal film
R401	1-214-174-00	56 k	¼ W	1% metal film
R402	1-214-168-00	33 k	¼ W	1% metal film
R403	1-214-156-00	10 k	¼ W	1% metal film
R404	1-214-164-00	22 k	¼ W	1% metal film
R405	1-214-148-00	4.7 k	¼ W	1% metal film
R406, 407	1-214-618-00	100 k	¼ W	1% metal film
R408	1-214-156-00	10 k	¼ W	1% metal film
RV101, 201	1-224-249-XX	1k-B, adjustable; offset		

MISCELLANEOUS

J1	1-507-630-21	Jack, phono 4 p; INPUT/OUTPUT
RY1	1-515-328-00	Relay
S1		Switch, pushbutton; MC/PASS
T1	⚠1-446-307-00	Transformer, power
	⚠1-534-817-XX	Cord, power

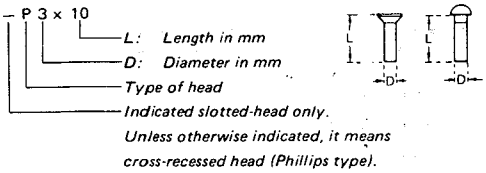
ACCESSORIES AND PACKING MATERIALS

Part No.	*Description*
2-259-114-00	Carton
2-259-115-00	Cushion, side
2-259-116-00	Cushion, upper
2-259-117-00	Cushion, lower
3-701-623-00	Bag, plastic; instruction manual
3-701-628-00	Bag, plastic; power cord
3-701-630-00	Bag, plastic
3-770-717-11	Manual, instruction

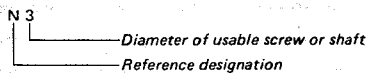
Note: The components identified by shading and mark ⚠ are critical for safety. Replace only with part number specified.

HARDWARE NOMENCLATURE

Screw:



Nut, Washer, Retaining ring:



Reference Designation	Shape	Description	Remarks
SCREWS			
P		pan-head screw	binding-head (B) screw for replacement
PWH		pan-head screw with washer face	binding-head (B) screw and flat washer for replacement
PS PSP		pan-head screw with spring washer	binding-head (B) screw and spring washer for replacement
PSW PSPW		pan-head screw with spring and flat washers	binding-head (B) screw and spring and flat washers for replacement
R		round-head screw	binding-head (B) screw for replacement
K		flat-countersunk-head screw	
RK		oval-countersunk-head screw	
B		binding-head screw	
T		truss-head screw	binding-head (B) screw for replacement
F		flat-fillister-head screw	
RF		fillister-head screw	
BV		braizer-head screw	

Reference Designation	Shape	Description	Remarks
SELF-TAPPING SCREWS			
TA		self-tapping screw	ex: TA, P 3 x 10
PTP		pan-head self-tapping screw	binding-head self-tapping (TA, B) screw for replacement
PTPWH		pan-head self-tapping screw with washer face	binding-head self tapping (TA, B) screw and flat washer for replacement
PTTWH		pan-head thread-rolling screw with washer face	binding-head (B) screw and flat washer for replacement
SET SCREWS			
SC		set screw	
SC		hexagon-socket set screw	ex: SC 2.6 x 4, hexagon socket
NUT			
N		nut	
WASHERS			
W		flat washer	
SW		spring washer	
LW		internal-tooth lock washer	ex: LW3, internal
LW		external-tooth lock washer	ex: LW3, external
RETAINING RINGS			
E		retaining ring	
G		grip-type retaining ring	

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